CHBE 303
Computer Programming in Chemical Engineering

Dilip N. Asthagiri

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E-mail: dna6@rice.edu
Office: B235 Abercrombie
Lecture: SEW 303
Laboratory: DCH Sym II

Office Hours: 11:00 AM–12:30 PM (W)
Class Hours: 1:00 PM –1:50 PM (M)
Lab Hours: 1:00 PM – 1:50 PM (W)
2:00 PM – 2:50 PM (W)

Teaching assistants

Arjun Valiya Parambathu (Graduate student; Dean's TA)	av42@rice.edu
Winnie Shi (Graduate student)	whs2@rice.edu
Chun-Yen Yiu (Graduate student)	cl89@rice.edu
Brandon Johnson (Duncan College)	bmj4@rice.edu
William Andrews (Jones College)	woa1@rice.edu
Devon DeBalsi (Hanszen College)	dpd5@rice.edu

Course Description

Programming literacy is indispensable in modern Chemical Engineering practice. Programming literacy encompasses two inter-dependent aspects: (1) gaining proficiency in the programming language, an aspect that involves learning the elements that constitute the language, and (2) computational thinking, an aspect that is independent of the programming language and is a skill that is broadly applicable to all problem solving and analysis. This course will introduce both aspects using problems and realistic applications in Chemical Engineering. Throughout we will use the MATLAB environment.

Course Objectives

1. Understand the MATLAB interface, the editor, and how to save and execute programs
2. Gain familiarity with MATLAB help features and commonly used intrinsic mathematical functions

3. Understand and appropriately use MATLAB data types
4. Learn about scripts and functions and when to deploy each
5. Understand basic Boolean algebra, logical operations, truth value of statements and their use in programming
6. Learn the concept of iteration in programming (FOR and WHILE loops)
7. Learn the concept of selection in programming (IF, IF-ELSE, IF-ELSEIF, SWITCH-CASE)
8. Profiling a code and debugging
9. Understand and use modularization in programming
10. Learn to prepare aesthetically pleasing graphs using MATLAB
11. Develop computational thinking by coding numerical algorithms that address realistic problems
12. Overall, we expect the student to have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Required Readings

- Class notes and allied reading material that will be posted on Canvas
- In lieu of a class textbook, please get the student version of MATLAB (available for free for Rice students) — please see:
  https://www.mathworks.com/academia/tah-portal/rice-university-40580441.html.
- A textbook is **not required**. But students desirous of a book-style reference may want to look at the texts by Hahn and Valentine *Essential MATLAB* or Stormy Attaway *MATLAB: a practical introduction to programming and problem solving*.

Course Organization

We will discuss the organization in detail in the class and will post the plan as part of notes for week # 1. Briefly, the plan is as follows:

- We become familiar with MATLAB elements in weeks 1 and 2
- At the end of week 2 (and all subsequent weeks), we will post the **physical problem and a solution algorithm** that will motivate the discussion of the programming concept for the following week.
  - During the lecture period, we will discuss the programming concept
  - In the lab session, we will work on the code and solve a short problem
  - In the assignment, the programming concept and material covered earlier will be reinforced

- The course will comprise five (5) assignments which will be designated as non-pledged (see Honor code policy below)
- Two (2) assignments will be pledged (see Honor code policy below)

Honor code Policy

Students are encouraged to talk to each other, the teaching assistants, the instructor, or anyone else about any assignment in the course that is not specifically designated as pledged. For assignments that are pledged, you can **only discuss with the instructor and/or TAs**; you cannot consult any other resource (excluding MATLAB help files). For all assignments, submitted solutions to assignments may not be copied from any source.

ADA Statement

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with the instructor during the **first two weeks of class**. All discussions will remain confidential. Students with disabilities will need to also contact Disability Support Services in the Allen Center.

Grading Policy

Grade	%
MATLAB Onramp	10
Non-pledged assignments	55
Pledged assignments	35

Late assignments will incur a penalty of 20% / day after the submission deadline.
Provisionally, we plan to follow the distribution below in assigning letter grades. Past experience suggests a class average of approximately 85; reasonable adjustments will be made if the average drops much below our expectation.

Grade	%	Grade	%
A+	≥ 98.5	C+	$68.0 - 72.9$
A	$93.0 - 98.4$	C	$60.0 - 67.9$
A-	$88.0 - 92.9$	C-	$55.0 - 59.9$
B+	$83.0 - 87.9$	D	$50.0 - 54.9$
B	$78.0 - 82.9$	F	< 50
B-	$73.0 - 77.9$		